WHAT IS CLAIMED IS:

1. A hydrogravity process for reclaiming a thermoplastic feedstock, comprising the steps of:

granulating a solid feedstock comprising a plurality of domains having different densities into a mixture of particles each of which comprises substantially a single domain component;

adding said granulated feedstock to a first binary hydrogravity separation tank having an aqueous solution specific gravity intermediate to one or more higher density heavier feedstock component particles and intermediate to one or more lighter feedstock component particles;

separately removing said heavier feedstock component particles and said lighter feedstock component particles;

selecting and feeding either said heavier or said lighter feedstock component particles to at least one additional sequential hydrogravity separation tank having substantially the same specific gravity as said first hydrogravity separation tank and removing said selected component particles therefrom; and

collecting said selected purified component particles.

2. A hydrogravity reclaiming process according to claim 1, wherein said feedstock components comprise at least one inorganic filler, at least one metal, at least one type of wood, at least one type of paper, or at least one type of plastic, or combinations thereof, wherein said plastic is at least one homopolymer or copolymer of a thermoplastic, or a homopolymer or copolymer of a thermoset;

wherein the number of sequential hydrogravity separation tanks is from about 2 to about 10; and

including feeding said selectively removed component particles to a dispersion mixer and substantially dispersing any agglomerated component particles.

3. A hydrogravity reclaiming process according to claim 2, wherein said intermediate specific gravity of said aqueous solution in each hydrogravity tank is substantially the same, wherein said intermediate specific gravity of said aqueous solution is at least 0.05 different than said selected one or more heaviest or lightest component particles;

wherein the specific gravity of each feedstock component particles is at least 0.05 different than any other feedstock component;

wherein the viscosity of said aqueous solution in each tank is less than about 50 centiposes; and

wherein said dispersion mixer has at least one dispersion zone.

4. A hydrogravity reclaiming process according to claim 3, wherein said specific gravity of said aqueous solution is at least 0.10 different than said selected one or more heaviest or lightest component particles, wherein the number of said hydrogravity separation tanks is from about 3 to about 8, and

including utilizing said dispersion mixer before each said hydrogravity separation tank.

5. A hydrogravity reclaiming process according to claim 4, wherein said granulated feedstock comprises a copper component, a thermoplastic polyvinyl chloride component, a thermoplastic nylon component, and a thermoplastic polyolefin component;

wherein said specific gravity of said aqueous solution is less than only said heaviest feedstock component particles; and

removing only said heaviest component particles from the bottom of each said hydrogravity separation tank and recycling said remaining thermoplastic particles to each said sequential separation tank.

6. A hydrogravity reclaiming process according to claim 1, wherein the purity of said collected, selected thermoplastic component particles is at least 95% by weight.

7. A hydrogravity reclaiming process according to claim 4, wherein the purity of said collected, selected thermoplastic component particles is at least 99% by weight.

8. A hydrogravity reclaiming process according to claim 1, comprising the steps of feeding particles of said non-selected remaining feedstock components to a hydrogravity separation tank having an aqueous solution specific gravity less than only a selected remaining heaviest thermoplastic feedstock component or greater than only a selected remaining lightest thermoplastic feedstock component;

removing said selected remaining thermoplastic component particles;

feeding said selected remaining feedstock component particles to at least one additional hydrogravity separation tank having substantially the same specific gravity as said prior hydrogravity separation tank and removing said second selected remaining feedstock component particles therefrom; and

collecting said selected remaining purified feedstock component particles.

9. A hydrogravity reclaiming process according to claim 3, comprising the steps of feeding particles of said non-selected remaining feedstock

components to a first hydrogravity separation tank having an aqueous solution specific gravity less than only a selected remaining heaviest thermoplastic feedstock component or greater than only a selected remaining lightest thermoplastic feedstock component;

removing said selected remaining thermoplastic component particles;

feeding said selected remaining feedstock component particles to at least one additional hydrogravity separation tank having substantially the same specific gravity as said prior hydrogravity separation tank and removing said second selected remaining feedstock component particles therefrom; and

collecting said selected remaining purified feedstock component particles.

10. A hydrogravity reclaiming process according to claim 5, comprising the steps of feeding particles of said non-selected remaining feedstock components of said PVC, said polyethylene and said nylon to a first hydrogravity separation tank having an aqueous solution specific gravity greater than only the selected PVC thermoplastic feedstock component;

removing said selected PVC thermoplastic component particles;

feeding said selected PVC feedstock component particles to at least one additional hydrogravity separation tank having substantially the same specific gravity as said prior hydrogravity separation tank and removing said selected PVC feedstock component particles therefrom; and

collecting said selected purified PVC feedstock component particles.

11. A hydrogravity reclaiming process according to claim 1, wherein said aqueous solution comprises water and one or more salts.

12. A hydrogravity reclaiming process according to claim 4, wherein said aqueous solution comprises water and one or more salts, wherein said salt contains a positive component comprising an alkali metal, an alkaline earth metal, or a transition metal, or combinations thereof, and a negative component comprising a halogen, oxygen, or an oxygen-containing compound, a phosphorus containing compound, a nitrogen-containing compound, a sulfur containing compound, the non-metal portion of a metal complex, or combinations thereof.

13. A hydrogravity reclaiming process according to claim 5, wherein said aqueous solution comprises water and a salt comprising potassium carbonate, zinc chloride, ferric chloride, ferrous chloride calcium chloride, calcium sulfate, zinc sulfate, zinc oxide, sodium chloride, sodium hydroxide, sodium zincate, polytungstate, magnesium chloride, or combinations thereof.

14. A hydrogravity reclaiming process according to claim 9, wherein said aqueous solution comprises water and a salt comprising potassium carbonate, zinc chloride, ferric chloride, ferrous chloride calcium chloride, calcium sulfate, zinc sulfate, zinc oxide, sodium chloride, sodium hydroxide, sodium zincate, polytungstate, magnesium chloride, or combinations thereof.

15. A system for reclaiming a feedstock, comprising:

a plurality of hydrogravity separation tanks; each said tank adapted to receive at least a plurality of feedstock domains in the form of feedstock component particles, each particle containing substantially only one component;

each said separation tank containing an aqueous solution having substantially the same specific gravity intermediate to one or more heavier

feedstock component particles and intermediate to one or more lighter feedstock component particles;

each said separation tank adapted to separate said one or more heavier feedstock component particles from said one or more lighter feedstock component particles from said feedstock,

a plurality of dispersion mixers, at least one said mixer located before at least one said separation tank; and said dispersion mixer having at least one dispersing zone for substantially dispersing any agglomerated feedstock component particles.

16. A system for reclaiming feedstock component particles according to claim 15, wherein the number of said hydrogravity separation tanks is from 2 to about 10, and wherein the specific gravity of said aqueous solution is 0.05 less than said selected one or more heavier feedstock component particles or 0.05 greater than said selected one or more lighter feedstock component particles.

17. A system for reclaiming feedstock component particles according to claim 16, wherein the viscosity of said aqueous solution is less than about 50 centipose, wherein said aqueous solution comprises at least one salt; and

wherein each said mixer is located before each said hydrogravity separation tank for receiving said selected feedstock component particles.

18. A system for reclaiming feedstock component particles according to claim 15, wherein said aqueous solution comprises water and one or more salts, wherein said salt contains a positive component comprising an alkali metal, an alkaline earth metal, or a transition metal, or combinations thereof, and a negative component comprising a halogen, oxygen, or an oxygen-

containing compound, a phosphorus containing compound, a nitrogen-containing compound, a sulfur containing compound, the non-metal portion of a metal complex, or combinations thereof; and

wherein said system is capable of purifying said selected thermoplastic component particles to a purity of at least about 90% by weight.

19. A system for reclaiming feedstock component particles according to claim 16, wherein said aqueous solution comprises water and a salt comprising potassium carbonate, zinc chloride, ferric chloride, ferrous chloride calcium chloride, calcium sulfate, zinc sulfate, zinc oxide, sodium chloride, sodium hydroxide, sodium zincate, polytungstate, magnesium chloride, or combinations thereof.

20. A system for reclaiming feedstock component particles according to claim 17, wherein said aqueous solution comprises water and a salt comprising potassium carbonate, zinc chloride, ferric chloride, ferrous chloride calcium chloride, calcium sulfate, zinc sulfate, zinc oxide, sodium chloride, sodium hydroxide, sodium zincate, polytungstate, magnesium chloride, or combinations thereof; and

wherein said feedstock components are plastic components, wherein said plastic component is one or more homopolymers or copolymers of a thermoplastic, or a homopolymer, or a copolymer of one or more thermoset polymers, or combinations thereof, and wherein said specific gravity of said aqueous solution is less than only a selected heaviest plastic feedstock component particles or greater than only a selected lightest plastic feedstock component particles.

21. A process for separating feedstock particles, comprising the steps of:

feeding a plurality of different feedstock component particles to a side inlet of a hydrogravity separation tank having an aqueous solution therein, said tank having a bottom outlet and a top outlet, said tank having a plurality of side walls the angle of inclination with respect to the horizontal of each said side wall being greater than the angle of repose of any of said feedstock particle in said aqueous solution; a plurality of said feedstock components having a different specific gravity than any other feedstock component; said aqueous solution having a specific gravity less than only the heaviest feedstock component particles or greater than only the lightest feedstock component particles; and

hydrogravity separating either only said lightest component particles from the top of said tank or separating only said heaviest component particles from the bottom of said tank.

22. A process according to claim 21, wherein the specific gravity of a particular feedstock component particle is at least 0.05 less or greater than another feedstock component particle;

wherein said angle of repose of any said side wall is at least 45 degrees with respect to said horizontal; and

wherein said side tank inlet is located from about 10% to about 90% of said tank height.

23. A process according to claim 22, wherein said feedstock component comprises at least one homopolymer or copolymer thermoplastic, or at least one homopolymer or copolymer thermoset, or combinations thereof, and wherein the specific gravity of said aqueous solution is at least 0.10 less than

said heaviest plastic component particle or 0.10 greater than the lightest thermoplastic component particle.

24. A process according to claim 23, wherein said side inlet is located from about 30% to about 70% of said tank height, and wherein the viscosity of said aqueous solution is about 50 centipose or less.

25. A process according to claim 21, wherein said plurality of thermoplastic component particles comprise one or more inorganic fillers, one or more metals, one or more thermoplastic polymers, one or more thermoset polymers, one or more different types of wood, one or more different types of paper, and combinations thereof.

26. A process according to claim 24, wherein said plurality of thermoplastic component particles comprise at least two thermoplastic polymers, wherein said thermoplastic polymers include polyolefins; styrenic polymers; acrylic polymers; polyvinyl esters; polyvinyl alcohol; chlorine-containing polymers; various fluorocarbon polymers; polyamides; polyesters; polyurethanes; polycarbonates; copolymers of the above, or combinations thereof.

27. A process according to claim 21, wherein said aqueous solution comprises water and at least one salt.

28. A process according to claim 23, wherein said aqueous solution comprises water and a salt comprising potassium carbonate, zinc chloride, ferric chloride, ferrous chloride calcium chloride, calcium sulfate, zinc sulfate,

zinc oxide, sodium chloride, sodium hydroxide, sodium zincate, polytungstate, magnesium chloride, or combinations thereof.

29. A process according to claim 24, wherein said aqueous solution comprises water and a salt comprising potassium carbonate, zinc chloride, ferric chloride, ferrous chloride calcium chloride, calcium sulfate, zinc sulfate, zinc oxide, sodium chloride, sodium hydroxide, sodium zincate, polytungstate, magnesium chloride, or combinations thereof.

30. A hydrogravity tank for separating thermoplastic particles comprising:

a tank adapted to receive an aqueous solution, said tank having a side inlet, a bottom outlet and a top outlet;

the aqueous solution adapted to receive at least three different solid feedstock components each having a different specific gravity, the aqueous solution adapted to have a specific gravity less than only the heaviest feedstock component or greater than only the lightest feedstock component; and

said tank having side walls, each said side wall having a angle of inclination with respect to the horizon so that said feedstock particles in the aqueous solution are not capable of being reposed on said tank side walls.

31. A multiple stage dispersion mixer for a feedstock, comprising:

an inlet;

an outlet;

a plurality of mixing zones between the inlet and outlet;

a zone separation element located between adjacent mixing zones, each said zone separation element having an aperature adapted to allow fluid travel between adjacent mixing zones; and

a mixing impeller located in each mixing zone, wherein at least one of the mixing impellers is a radial flow dispersion impeller.

32. A mixer according to claim 31, wherein 2 to about 10 mixing zones are present, and wherein the aperature area ranges in an amount from about 10% to about 50% of the total zone separation element area.

33. A mixer according to claim 32, wherein 3 to about 5 mixing zones are present, and wherein the aperature area ranges in an amount from about 15% to about 35% of the total zone separation element area.

34. A mixer according to claim 32, wherein the mixer has a body which is substantially cylindrical in shape, wherein the zone separation element is annular.

35. A mixer according to claim 34, wherein each mixing zone has a length to diameter ratio of from about 0.5 to about 5.

36. A mixer according to claim 35, wherein the radial flow dispersion impeller has a diameter which is about 20% to about 50% of the mixer diameter, and wherein at least one of mixing zone utilizes an axial flow mixing impeller.

37. A mixer according to claim 36, wherein the mixing impellers are connected to a single shaft adapted to have a rotation of about 50 to about 5,000 RPM.

38. A mixer according to claim 36, wherein at least four mixing zones are present with at least two radial flow dispersion impellers and at least two axial flow mixing impellers being utilized.

39. A mixer according to claim 38, wherein four mixing zones are utilized with the first and fourth zones having axial flow mixing impellers and the second and third zones having radial flow dispersion impellers.

40. A mixer according to claim 31, wherein the mixer contains an aqueous solution comprising granulated thermoplastic particles.

41. A mixer according to claim 39, wherein the mixer contains an aqueous solution comprising granulated thermoplastic particles.

42. A mixer according to claim 31, wherein said feedstock components comprise at least one inorganic filler, at least one metal, at least one type of wood, at least one type of paper, or at least one type of plastic, or combinations thereof, wherein said plastic is at least one homopolymer or copolymer of a thermoplastic, or a homopolymer or copolymer of a thermoset.

43. A mixer according to claim 35, wherein said feedstock components comprise at least one inorganic filler, at least one metal, at least one type of wood, at least one type of paper, or at least one type of plastic, or

combinations thereof, wherein said plastic is at least one homopolymer or copolymer of a thermoplastic, or a homopolymer or copolymer of a thermoset.

44. A mixer according to claim 31, wherein said granulated feedstock comprises a copper component, a thermoplastic polyvinyl chloride component, a thermoplastic nylon component, and a thermoplastic polyolefin component.

45. A mixer according to claim 37, wherein said granulated feedstock comprises a copper component, a thermoplastic polyvinyl chloride component, a thermoplastic nylon component, and a thermoplastic polyolefin component.

46. A mixer according to claim 31, wherein said granulated feedstock comprises a copper component and a polyethylene component, or a copper component and a blend of polyethylene and polypropylene.

47. A mixer according to claim 31, wherein said granulated feedstock comprises nylon and polytetrafluoroethylene.

48. A mixer according to claim 31, wherein said granulated feedstock comprises a copper component and a polytetrafluoroethylene component.